



## 1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:

<u>78028</u>	<u>01</u>	<u>E</u>	<u>X</u>
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

1.2.1 Device type. The device type shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	1524	Regulating pulse width modulator

1.2.2 Case outline. The case outline shall be as designated in appendix C of MIL-M-38510, and as follows:

<u>Outline letter</u>	<u>Case outline</u>
E	D-2 (16-lead, .840" x .310" x .200"), dual-in-line package

## 1.3 Absolute maximum ratings.

Input voltage ( $V_{IN}$ )	40 V dc
Collector output current	100 mA dc
Reference output current	50 mA dc
Power dissipation at $T_A = +25^\circ\text{C}$ <u>1/</u>	1,000 mW
Power dissipation at $T_C = +25^\circ\text{C}$ <u>2/</u>	2,000 mW
Junction temperature ( $T_J$ )	+150°C
Thermal resistance:	
Junction-to-ambient ( $O_{JA}$ )	100°C/W
Junction-to-case ( $O_{JC}$ )	(See MIL-M-38510, appendix C)
Oscillator charging current	5 mA
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C

## 1.4 Recommended operating conditions.

Ambient operating temperature range ( $T_A$ )	-55°C to +125°C
Input voltage range	8 V dc to 40 V dc
Current through $C_T$ terminal	-0.03 mA to -2 mA
Timing resistor ( $R_T$ )	1.8 kΩ to 100 kΩ
Timing capacitor ( $C_T$ )	0.001 μF to 0.1 μF

1/ Derate at 10 mW/°C for  $T_A$  above +50°C.

2/ Derate at 16 mW/°C for  $T_C$  above +25°C.

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DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO 45444

SIZE  
**A**

**78028**

REVISION LEVEL  
G

SHEET  
**2**

## 2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

### SPECIFICATION

#### MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

### STANDARD

#### MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

## 3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Logic diagram. The logic diagram shall be as specified on figure 2.

3.2.3 Case outline. The case outline shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full ambient operating temperature range.

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		<b>78028</b>
		REVISION LEVEL G	SHEET <b>3</b>

TABLE I. Electrical performance characteristics.

Test		Symbol	Conditions 1/ $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified	Group A sub- groups	Limits		Unit
					Min	Max	
Reference section	Output voltage	$V_{\text{REF}}$		1,2,3	4.8	5.2	V
	Line regulation	$V_{\text{RLINE}}$	$8\text{ V} \leq V_{\text{IN}} \leq 40\text{ V}$	1,2,3		20	mV
	Load regulation	$V_{\text{RLOAD}}$	$0\text{ mA} \leq I_L \leq 20\text{ mA}$	1,2,3		50	mV
	Short-circuit current limit	$I_{\text{OS}}$	$V_{\text{REF}} = 0\text{ V}, T_A = +25^{\circ}\text{C}$	1		150	mA
	Temperature stability		2/	1,2,3		1	%
	Ripple rejection	$\frac{\Delta V_{\text{IN}}}{\Delta V_{\text{REF}}}$	$f = 120\text{ Hz}$ $T_A = +25^{\circ}\text{C}$ 3/	4	60		dB
Oscillator section	Voltage stability	$\Delta f_{\text{OSC}}$	$8\text{ V} \leq V_{\text{IN}} \leq 40\text{ V}$ $T_A = +25^{\circ}\text{C}$	1		1	%
	Temperature stability		2/	1,2,3		6	%
Error amplifier section	Input offset voltage	$V_{\text{IO}}$	$V_{\text{CM}} = 2.5\text{ V}$	1,2,3		5	mV
	Input bias current	$I_{\text{IB}}$	$V_{\text{CM}} = 2.5\text{ V}$	1,2,3		10	$\mu\text{A}$
	Open loop gain	$A_{\text{VS}}$		4,6 5	72 66		dB
	Common mode rejection ratio	CMRR	$1.8\text{ V} \leq V_{\text{CM}} \leq 3.4\text{ V}$	4 5,6 2/	70		dB
	Output high level	$V_{\text{OH}}$	$T_A = +25^{\circ}\text{C}$	1	3.8		V
	Output low level	$V_{\text{OL}}$	$T_A = +25^{\circ}\text{C}$	1		0.5	V

See footnotes at end of table.

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DAYTON, OHIO 45444

SIZE  
**A**

78028

REVISION LEVEL  
G

SHEET  
4

TABLE I. Electrical performance characteristics - Continued.

Test		Symbol	Conditions 1/ $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Limits		Unit
					Min	Max	
Comparator section	A min duty cycle	$t_{\text{ON}}$ 4/ $t_{\text{OSC}}$ (MIN)	$V_{\text{CM}} = 2.5\text{ V}$	4,5,6		0	%
	B min duty cycle		$V_{\text{COMP}} = 0.5\text{ V}$				
	A max duty cycle	$t_{\text{ON}}$ 4/ $t_{\text{OSC}}$ (MAX)	$V_{\text{CM}} = 2.5\text{ V}$	4,5,6	45		%
	B max duty cycle		$V_{\text{COMP}} = 3.8\text{ V}$				
Current limiting section	Sense voltage	$V_{\text{SEN}}$	Pin 9 = 2 V with error amplifier set for maximum out, $T_A = +25^{\circ}\text{C}$	1	190	210	mV
	Common mode voltage	$V_{\text{CM}}$	2/	1,2,3	-0.3	+0.3	V
Output section	Emitter output voltage	$V_{\text{EO}}$	$V_{\text{IN}} = 20\text{ V dc}$	1,2,3	17		V
	Sat. voltage Side A 20 mA Side B 20 mA	$V_{\text{CE(SAT)}}$	$I_{\text{C}} = 50\text{ mA}$	1,2,3		2	V
	Collector leak- age current Side A Side B	$I_{\text{CEX}}$	$V_{\text{CE}} = 40\text{ V dc}$	1,2,3		50	$\mu\text{A}$
	Rise time A Rise time B	$t_{\text{r}}$	$R_{\text{C}} = 2\text{ k}\Omega$	$\frac{9}{10,11}$ 2/		.4	$\mu\text{s}$
	Fall time A Fall time B	$t_{\text{f}}$	$R_{\text{C}} = 2\text{ k}\Omega$	$\frac{9}{10,11}$ 2/		.2	$\mu\text{s}$
Standby current		$I_{\text{IN}}$	$V_{\text{IN}} = 40\text{ V dc}$	1,2,3		10	mA

1/  $V_{\text{IN}} = 20\text{ V dc}$ ,  $f = 20\text{ kHz}$ , unless otherwise stated.

2/ If not tested, shall be guaranteed.

3/ Guaranteed by correlation to other tested parameters.

4/  $t_{\text{OSC}}$  is the period of the output waveform.

STANDARDIZED  
MILITARY DRAWING  
DEFENSE ELECTRONICS SUPPLY CENTER  
DAYTON, OHIO 45444

SIZE  
**A**

78028

REVISION LEVEL  
G

SHEET  
**5**

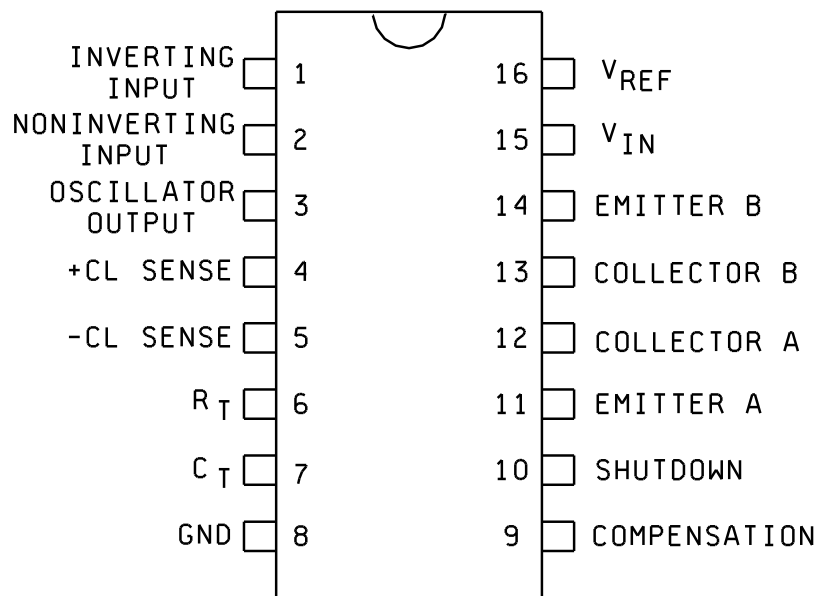


FIGURE 1. Terminal connections.

<b>STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444</b>	<b>SIZE A</b>		<b>78028</b>
		REVISION LEVEL G	SHEET 6

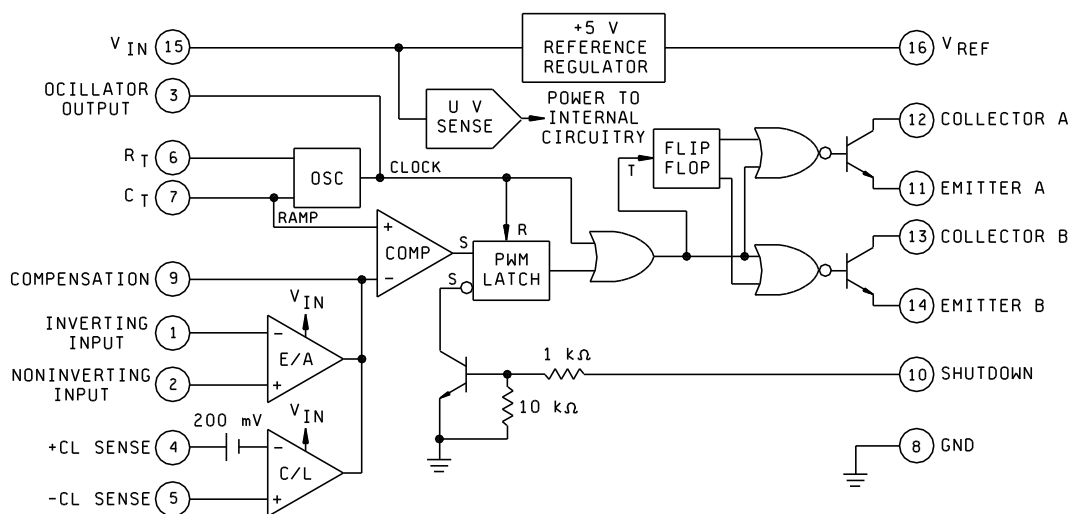


FIGURE 2. Logic diagram.

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DAYTON, OHIO 45444

SIZE  
**A**

**78028**

REVISION LEVEL  
G

SHEET  
**7**

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

- a. Burn-in test, method 1015 of MIL-STD-883.
  - (1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).
  - (2)  $T_A = +125^{\circ}\text{C}$ , minimum.
- b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

##### 4.3.1 Group A inspection.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 7 and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

##### 4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test conditions, method 1005 of MIL-STD-883
  - (1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).
  - (2)  $T_A = +125^{\circ}\text{C}$ , minimum.
  - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE <b>A</b>		<b>78028</b>
		REVISION LEVEL G	SHEET <b>8</b>



TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*,2,3,4
Group A test requirements (method 5005)	1,2,3,4,5,6,9, 10,11**
Groups C and D end-point electrical parameters (method 5005)	1

\* PDA applies to subgroup 1.

\*\* Subgroups 10 and 11, if not tested, shall be guaranteed to the limits specified in table I.

## 5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

## 6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Replaceability is determined as follows:

- a. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.
- b. When a QPL source is established, the part numbered device specified in this drawing will be replaced by the microcircuit identified as part number M38510/12601BEX.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

<b>STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444</b>	<b>SIZE A</b>		<b>78028</b>
		<b>REVISION LEVEL G</b>	<b>SHEET 9</b>

6.4 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. The vendors listed herein have agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>	Replacement military specification part number
7802801EX <u>2/</u>	64155 48726 U4637 34333 18324	SG1524J/883B UC1524J/883B IP1524J/883B SG1524J/883B SG1524C/BEA	M38510/12601BEX

- 1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.
- 2/ Inactive for new design use QPL M38510 product.

<u>Vendor CAGE number</u>	<u>Vendor name and address</u>
18324	Signetics Corp 4130 S. Market Court Sacramento, CA 95834
34333	Silicon General 11861 Western Avenue Garden Grove, CA 92641
48726	Unitrode 7 Continental Boulevard Merrimack, NH 03054
64155	Linear Technology Corporation 1630 McCarthy Boulevard Milpitas, CA 95035-7487
U4637	Seagate Microelectronics LTD 900 Disc Drive Scotts Vally, CA 95066

<b>STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444</b>	<b>SIZE A</b>		<b>78028</b>
		<b>REVISION LEVEL G</b>	<b>SHEET 10</b>